(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 504 518 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **91307631.1**

(51) Int. Cl.5: **A42B 3/24**

(22) Date of filing: **19.08.91**

(30) Priority: **18.03.91 JP 15708/91 U**

(43) Date of publication of application:
**23.09.92 Bulletin 92/39**

(84) Designated Contracting States:
**BE CH DE ES FR GB IT LI NL**

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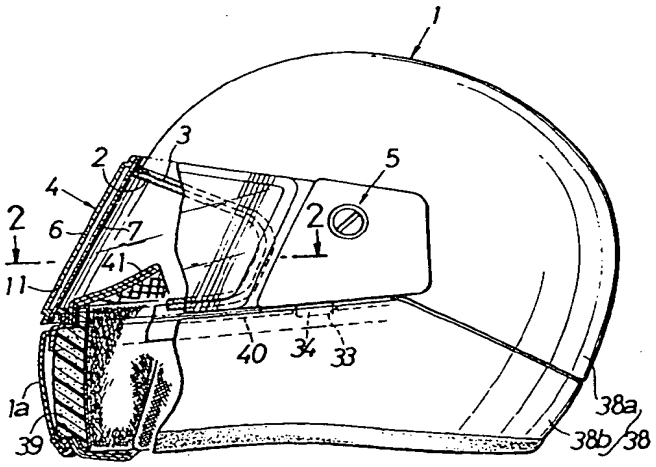
(54) **Helmet with visor.**

(57) A recess (8) is provided in the inner surface of a primary visor element (6) which is connected to a cap body (1) of a helmet through a pivotal mounting means (5), and a step (9) depressed from the inner surface of the primary visor element (6) is formed at the entire peripheral edge of an opening of the recess (8). An inner visor element (7) is fitted to the step (9) and bonded thereto with a flexible adhesive, so that a heat insulating space (11) tightly closed in the recess (8) is defined by the primary visor element (6) and the inner visor element (7). The inner surfaces of the primary visor element (6) and the inner visor element (7) are formed into a continuous surface (12) which comes into close contact with a sealing member (3) provided at a peripheral edge of a window opening (2) in the cap body (1). This ensures that condensation on the inner surface of the visor (4) can be prevented regardless of conditions of use such as the presence and absence of an air flow over the helmet and the temperature of the air.

FIG.1

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The present invention relates to helmets of a type having a visor and used primarily by a driver or a passenger of a snowmobile, a motorcycle or the like.

It is already known that when a helmet having a visor is in use with the visor fully closed, part of the air stream incident on the helmet as the vehicle travels along is directed to an inner surface of the visor in order to prevent condensation on the inner surface of the visor which may occur due to expiration of air from a user (for example, see Japanese Patent Application Laid-open No. 159507/88).

However, such a helmet suffers from the problem that when the vehicle is stationary, so that there is no longer an air flow incident on the visor, condensation is liable to form on the inner surface of the visor, and in use in a cold climate water vapour from the helmet wearer's breath may condense rapidly on the inner surface of the visor due to a large difference in temperature between the visor cooled by the outside air and the inside of the cap body. As a result, visibility through the visor may be significantly reduced.

According to the present invention, there is provided a helmet comprising a cap body and a visor attached at left and right ends thereof to the cap body through a pivotal mountings means for opening and closing a window opening made in a front surface of the cap body, characterised in that the visor comprises:

a primary visor element connected at left and right ends thereof to pivotal mounting means and having a recess in an inner surface, and an inner visor element fitted and coupled to a step which is formed at an entire peripheral edge of an opening of the recess and which forms part of the primary visor element, with a heat insulating space being defined in the recess by the primary visor element and the inner visor element, the primary visor element and the inner visor element having inner surfaces formed into a continuous surface coming into close contact with a sealing member provided on a peripheral edge of a window opening.

With the above feature of the present invention, by the fitting and coupling of the inner visor element to the step, both the visor elements can be correctly coupled to each other in a given relationship, so that the heat insulating space having a predetermined function is reliably defined between both the elements. Thus, the heat of the inner visor element can be retained by the heat insulating space and hence, condensation on the inner surface of the visor can be prevented regardless of conditions of use such as the presence and absence of an air flow incident on the helmet due to forward motion of the helmet through the air and the temperature of the outside air.

In addition, since the inner surfaces of the primary visor element and the inner visor element are formed into a continuous surface, the inner surface of the visor can be brought reliably into close contact with the sealing member at the peripheral edge of the window opening to tightly close the window opening, whenever the visor is fully closed. That is, even if a boundary line between the primary visor element and the inner visor element contacts the sealing member due to errors in fabrication and assembling of the pivotal mounting means, the function of the sealing member is maintained. Further, the primary visor element is connected to the pivotal mounting plate, so that not all the load applied to the visor is carried by the inner visor element. Therefore, it is possible to provide a reduction in wall thickness of the inner visor element and hence, a reduction in weight of the visor.

For a better understanding of the present invention and to show how it may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

Figure 1 is a partially sectioned side view of a helmet having a visor;

Figure 2 is a sectional view taken along a line 2-2 in Figure 1;

Figure 3 is an enlarged view of a portion of the helmet indicated by arrow 3 in Figure 2;

Figure 4 is an enlarged side view of a pivotal mounting means shown in Figure 1;

Figure 5 is a sectional view taken along a line 5-5 in Figure 4; and

Figure 6 is an exploded perspective view of the pivotal mounting means.

Referring to the drawings, Figure 1 shows a cap body 1 of a full-face type helmet having a chin-covering portion 1a immediately below a window opening 2 in a front surface thereof. A sealing member 3 made of rubber is fitted into and bonded to a peripheral edge of the window opening 2. A visor 4 is vertically movably mounted at its left and right opposite ends to the cap body 1 through a pivotal mounting means 5 to open and close the window opening 2. The visor 4 has an inner surface adapted to come into close contact with the sealing member 3 at a lowering limit to close the window opening 2, and is curved forwardly at a central portion to extend along a front profile of the cap body 1.

As shown in Figures 1 to 3 and 5, the visor 4 is comprised of a thick primary visor element 6 and a thin inner visor element 7. A knob 6a projects from a lower end of the primary visor element 6. A recess 8 is provided in an inner surface of the primary visor element 6 at a location corresponding to the window opening 2, and moreover, a step 9 is formed at the entire peripheral edge of an opening of the recess 8 which is inset from the inner

surface of the primary visor element 6. The step 9 has a depth equal to or slightly deeper than a thickness of the inner visor element 7. The entire peripheral edge of the inner visor element 7 overlies the step 9 and is bonded thereto with an adhesive 10 which remains flexible. A heat insulating space 11 enclosed by the recess 8 is defined by the inner visor element 7 and the primary visor element 6. At the same time, a continuous surface 12 is formed on the inner surfaces of the primary visor element 6 and the inner visor element 7 and capable of reliably coming into close contact with the sealing member 3.

Both the primary visor element 6 and the inner visor element 7 are formed of a synthetic resin having a high transparency and a low refractive index, e.g., polycarbonate, acrylic, or polyvinyl chloride resins. A transparent anti-misting or anti-fogging film 13 is formed on an inner surface of the recess 8 of the primary visor element 6 and inner and outer surfaces of the inner visor element 7.

The pivotal mounting means 5 for connecting the left and right ends of the visor will be described below in connection with Figures 4 to 6. The left and right pivotal mounting means 5 have the same structure and hence, only the left pivotal mounting means 5 will be described.

The pivotal mounting means 5 comprises a base plate 14 secured to a side of the cap body 1, an end plate 16 secured to an end of the primary visor element 6 by an eyelet 15, and a cover 17 covering the end plate 16 and supporting the end plate 16 for pivotal movement by cooperation with the base plate 14. Both the base plate 14 and the end plate 16 are formed from synthetic resin having high resistances to wear and shock, e.g. polyacetal, nylon or ABS.

A pair of through-holes 18 and 19 are provided in the base plate 14 at a vertical distance therebetween, and nuts 20 and 21 are embedded in the cap body 1 in correspondence to the through-holes 18 and 19. The base plate 14 is secured to the cap body 1 by screwing machine screws 22 and 23 inserted through the through-holes 18 and 19 into the nuts 20 and 21.

A cylindrical pivot 24 is projectingly provided on an outer side of the base plate 14 to concentrically surround the upper through-hole 18, and a pivot hole 25 is provided in the end plate 16, which pivot hole 25 is rotatably supported about the pivot 24. Further, a stationary stopper 26 and a locating pin 27 are projectingly provided on the outer side of the base plate 14 at its upper and lower portions, respectively, and a movable stopper 28 is formed on the end plate 16 for defining the fully-open position of the visor 4 by cooperation with the stationary stopper 26.

Projectingly provided on an inner side of the cover 17 are a cylindrical retainer 29 fitted over an outer periphery of a tip end of the pivot 24 to restrain the axial movement of the end plate 16, and a cylindrical spacer 30 abutting against the base plate 14 within the cylindrical retainer 29. The cylindrical spacer 30 is provided with a centrally disposed through-hole 31 coaxially aligned with the above-described through-hole 18. Thus, the cover 17 is secured to the cap body 1 together with the base plate 14 by inserting the machine screw 22 through the through-hole 31 and screwing it into the nut 20.

Further formed in the cover 17 are a cylindrical locating member 32 fitted over the locating pin 27, and a projection piece 34 engaged into an engage hole 33 in the outer side of the cap body 1. Thus, the rotation of the cover 17 about the pivot 24 can be inhibited by fitting of the locating pin 27 in the cylindrical locating member 32, and the fitting of the locating pin 27 in the cylindrical locating member 32 can be maintained, while preventing the outward flexing of a lower portion of the cover 17 by engagement between the engage hole 33 and the projection piece 34.

A click stop mechanism 35 is provided between the base plate 14 and the end plate 16 for retaining the visor 4 at its fully-closed position, a plurality of partially opening positions and its fully-opened position. The click stop mechanism 35 comprises several stationary click teeth 36, 36 --- projectingly provided on the outer side of the base plate 14 radially about the pivot 24, and a large number of movable click teeth 37, 37 --- projectingly provided on the inner side of the end plate 16 radially about the pivot hole 25. The click teeth 36, 36 --- and 37, 37--- are disengagably engaged with each other under the influence of resilient forces of the base plate 14 and the end plate 16.

As shown in Figures 4 and 5, the cap body 1 is comprised of a shell 38 made of FRP and a shock-absorbing liner 39 made of foamed polystyrene and bonded to an inner surface of the shell 38. The shell 38 is divided at a location corresponding to the middle of the chin-covering portion 2a into an upper shell portion 38a and a lower shell portion 38b, which are superposed at their divided ends, with the lower shell portion 38b being outside, and are rivetted to each other. In this case, the engage hole 33 is defined between the upper and lower shell portions 38a and 38b by cutting-out of a portion of an inwardly bent collar 40 at an upper end of the lower shell portion 38b.

An shown in Figures 1 and 2, a flexible expiration-air guide plate 41 is added to an upper edge of the chin-covering portion 1a of the cap body 1 to project inwardly of the cap body 1 and is adapted to deflect the expiration air from a user downwardly to prevent it from directly touching an

inner surface of the visor 4.

The operation of this embodiment will be described below.

When the helmet of the present invention is used with the visor 4 fully opened in cold districts or regions, even if the outer primary visor element 6 is cooled by the outside air, transfer or conduction of heat from the inner visor element 7 to the primary visor element 6 is inhibited by the heat insulating space 11 and the flexible adhesive 10, so that the inner visor element 7 can be maintained at a temperature substantially equal to that in the cap body 1, thereby preventing a clouding or fogging of the inner surface of the inner visor element 7 due to a large difference in temperature.

Moreover, since the anti-misting film 13 is formed on the inner surface of the inner visor element 7, even if a portion of the expiration air from the user flows past the expiration-air guide plate 41 to touch the inner visor element 7, misting due to this can be prevented.

Further, since the anti-misting film 13 is also formed on the inner surface of the primary visor element 6 and the outer surface of the inner visor element 7 which face to the heat insulating space 11, even if moisture should be contained in the air within the heat insulating space 11, misting due to such moisture can be likewise prevented.

Yet further, since the inner visor element 7 is fitted into and coupled to the step 9 formed at the entire peripheral edge of the opening of the recess 8 in the primary visor element 6, the elements 6 and 7, even if they are curved as described above, can be coupled in an exact relative position to define the heat insulating space 11 with an even thickness at every locations in the recess 8 during fabrication of the visor 4. Therefore, the heat insulating function of the heat insulating space 11 can be stabilised even in mass production.

Since the inner surfaces of the primary visor element 6 and the inner visor element 7 are formed into the continuous surface 12 by fitting the peripheral edge of the inner visor element 7 to the step 9, even if the sealing member 3 at the peripheral edge of the window opening 2 comes into contact with any part of the inner surface of the visor 4, the window opening 2 can be reliably and tightly closed. This ensures that errors in fabrication and assembling of the pivotal mounting means 5 or the like are substantially allowable.

To open and close the visor 4, a wearer of the helmet grasps the knob 6a of the primary visor element 6 and moves it vertically. During this time, the end plate 16 coupled to the primary visor element 6 is pivotally moved about the pivot 24 of the base plate 14, while at the same time, the stationary and pivotable click teeth 36 and 37 of the click stop mechanism 35 slide over one another tooth by tooth in discrete steps. When the desired degree of opening of the visor has been selected by the wearer, the knob 6a is released and the visor 4 is retained at the desired opened position by engagement of the click teeth 36 with the appropriate click teeth 37.

The primary visor element 6 may be subjected to a slight strain during pivoting of the visor about the pivotal mounting means 5, but such strain is absorbed by the flexible adhesive 10 and is extremely rarely transmitted to the inner visor element 7, ensuring that the elements 6 and 7 do not peel-off from one another. In addition, since the strain is rarely transmitted to the inner visor element 7, it is not necessary to ensure that the inner visor element 7 has a high strength, so that the inner visor element 7 may be made thinner than the primary visor element 6. This makes it possible to provide a reduction in weight of the visor 4 by reducing the wall thickness of the inner visor element 7.

## Claims

1. A helmet comprising a cap body and a visor attached at left and right ends thereof to the cap body through a pivotal mountings means for opening and closing a window opening made in a front surface of the cap body, characterised in that the visor comprises:

   a primary visor element connected at left and right ends thereof to pivotal mounting means and having a recess in an inner surface, and an inner visor element fitted and coupled to a step which is formed at an entire peripheral edge of an opening of the recess and which projects inwardly from the primary visor element, with a heat insulating space being defined in the recess by the primary visor element and the inner visor element, the primary visor element and the inner visor element having inner surfaces formed into a continuous surface coming into close contact with a sealing member provided on a peripheral edge of a window opening.

2. A helmet as claimed in claim 1, in which the inner visor element has a wall thickness less than that of the primary visor element and is bonded to the step of the primary visor element by means of a flexible adhesive.

3. A helmet as claimed in claim 1 or 2, further including a transparent condensation inhibiting film formed on the inner surface of the inner visor element.

4. A helmet as claimed in claim 3, in which the

transparent condensation inhibiting film is also formed on each of those surfaces of the primary and inner visor elements which face the heat insulating space.

5. A helmet as claimed in any one of the preceding claims, in which the pivotal mounting means comprises a base plate having a pivot on an outer surface thereof and secured to a side of the cap body, an end plate secured to an end portion of the primary visor element and pivotally supported on the pivot, and a cover for covering the end plate and supporting the end plate for pivotal movement by cooperation with the base plate, and the helmet further includes a click stop mechanism provided between the base plate and the end plate for retaining the visor stepwise between a fully-opened and a fully-closed position.

6. A helmet having a visor which comprises a primary visor element pivotally connected to the helmet, and a secondary visor element connected to and spaced from the primary visor element, a heat insulating space being defined between the primary visor element and the secondary visor element.

FIG.1

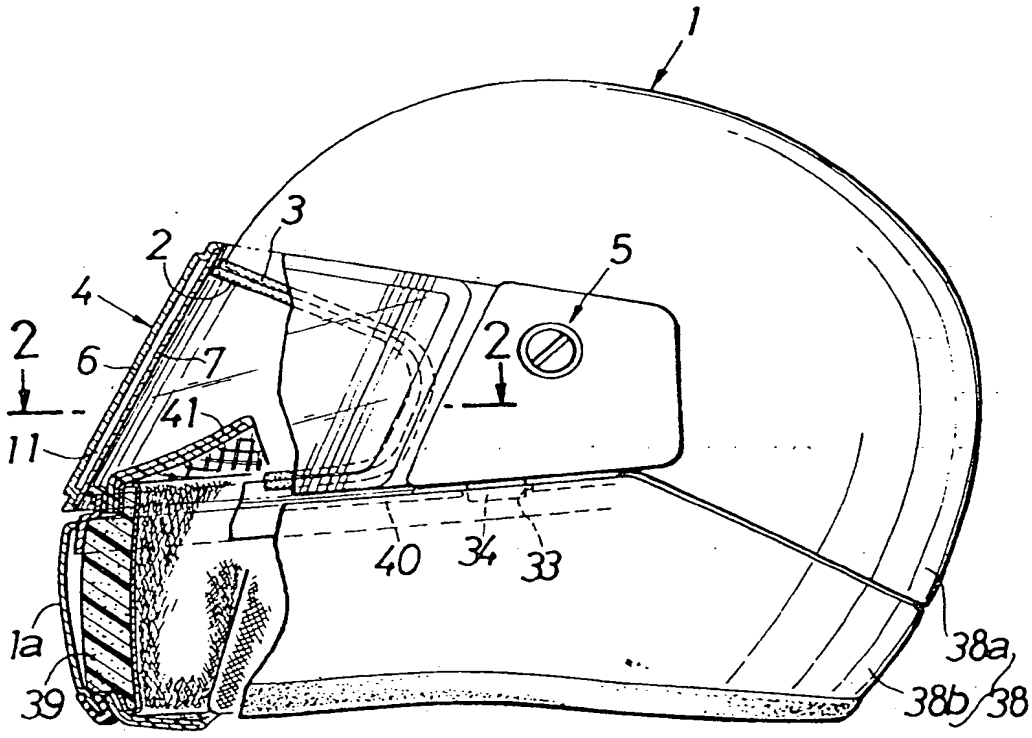

FIG.2

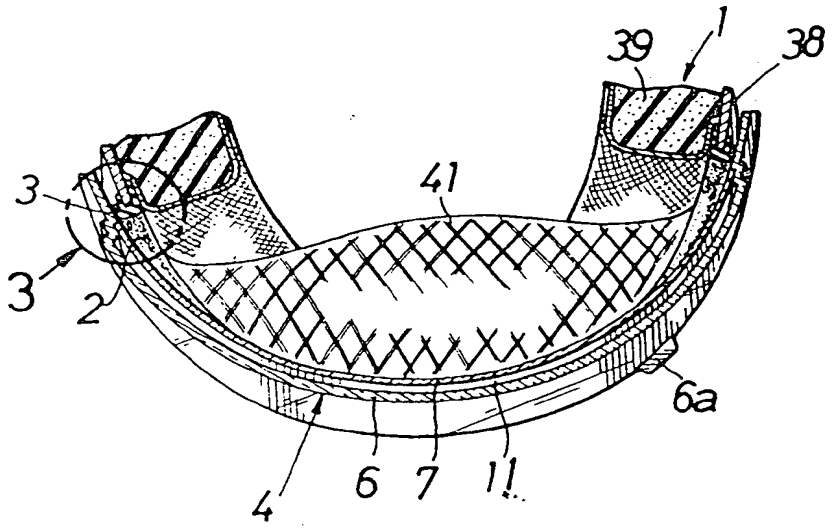

FIG.3

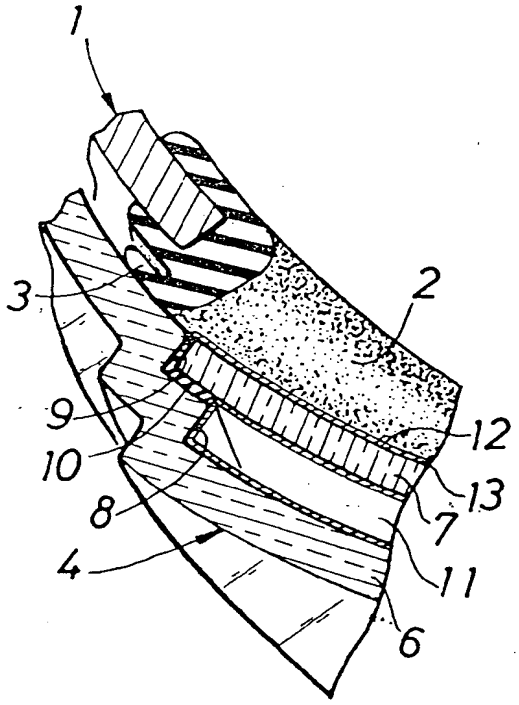

FIG.4

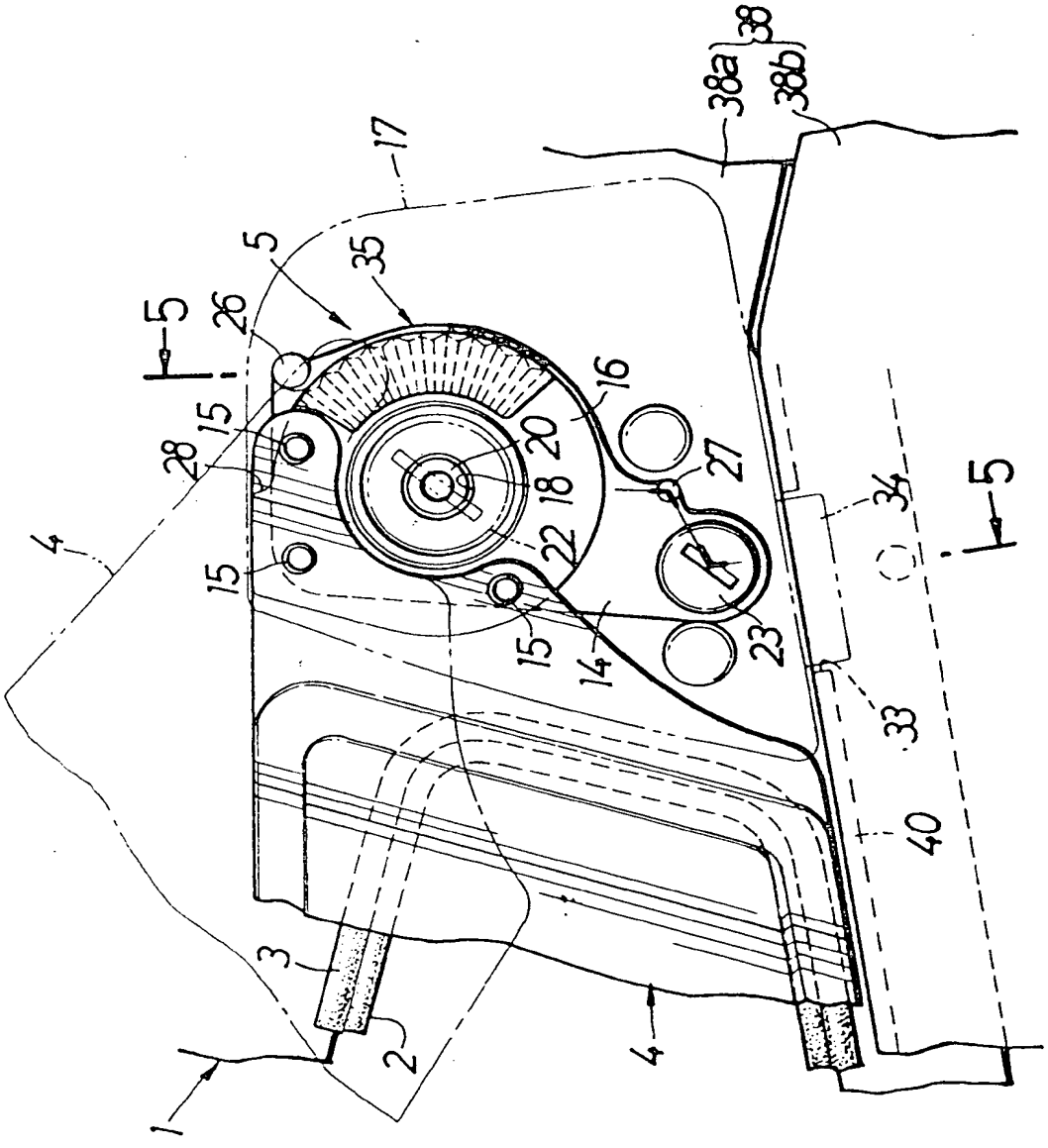
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FIG.5

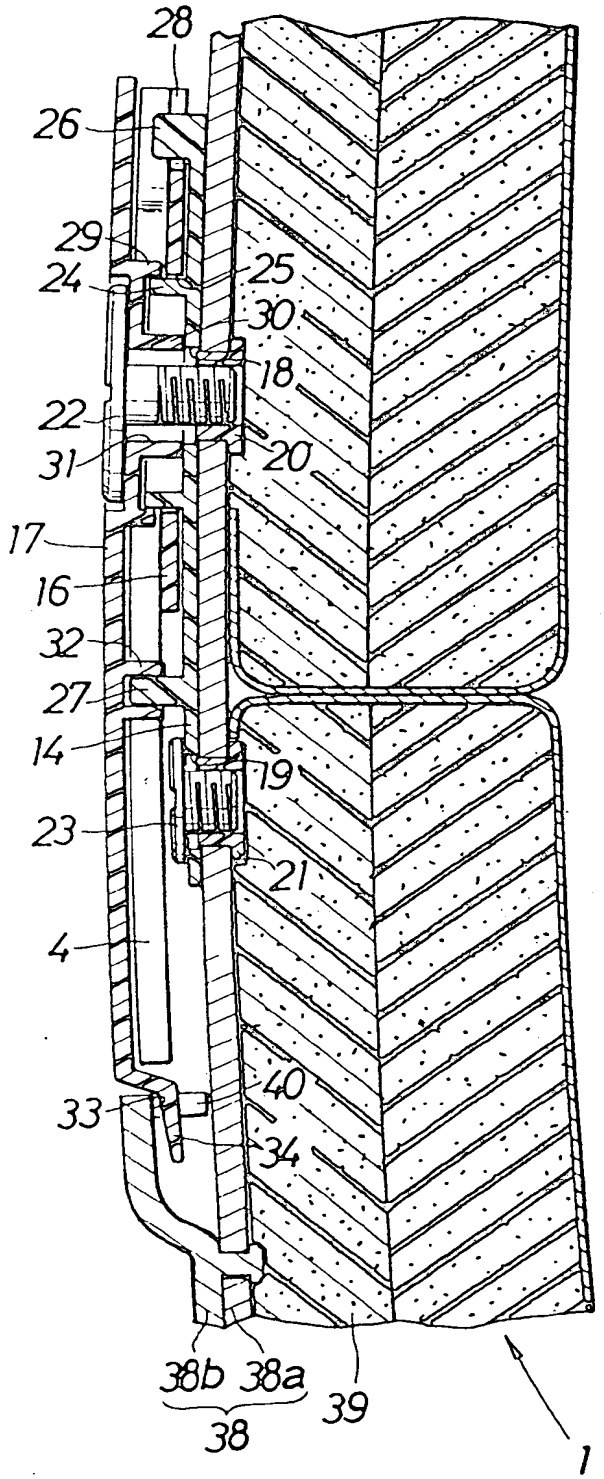
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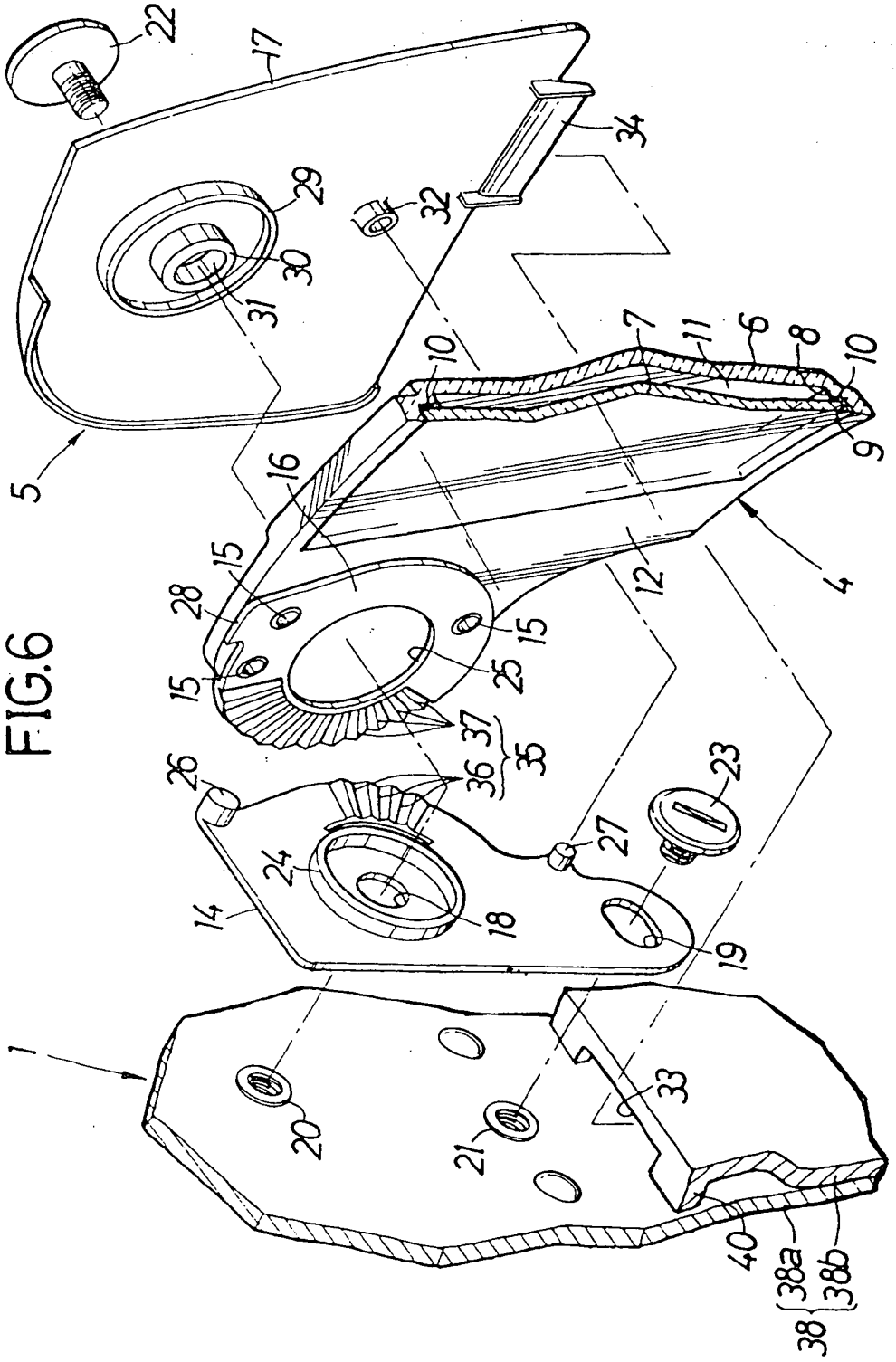
FIG.6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# EUROPEAN SEARCH REPORT

Application Number

EP 91 30 7631

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
|---|---|---|---|
| X | DE-A-3 323 419 (H. VOSS)<br>* page 4, paragraphs 3, 7 *<br>* page 5, paragraphs 2 - 4 *<br>* page 6, three last paragraphs *<br>* page 7 *<br>* claims 1,4-10; figures * | 1-4,6 | A42B3/24 |
| Y | | 5 | |
| Y | DE-U-8 910 304 (L. S.-C. CHEN)<br>* page 4, last paragraph - page 6, paragraph 1 *<br>* figure 1 * | 5 | |
| X | US-A-3 858 242 (E. R. GOODING)<br>* column 2, line 16 - line 35; figure 7 * | 1 | |
| A | DE-A-2 943 472 (B. J. LITTLER)<br>* page 22, paragraph 2 - page 23, paragraph 1 *<br>* figure 5 * | 1 | |
| A | PATENT ABSTRACTS OF JAPAN<br>vol. 014, no. 531 (C-0780)21 November 1990<br>& JP-A-02 221 403 ( YAMAHA MOTOR CO LTD ) 4 September 1990 | | TECHNICAL FIELDS SEARCHED (Int. Cl.5)<br>A42B<br>A61F |
| A | US-A-4 682 007 (J. M. HOLLANDER) | | |
| A | DE-A-2 063 092 (R. P. SMITH) | | |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 22 JUNE 1992 | BOURSEAU A.-M. |

CATEGORY OF CITED DOCUMENTS

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